

SCIENCE & EDUCATION Impact

Benefits from USDA/Land-Grant Partnership

Bacteria Busters

Food safety from farm to plate.

Foodborne pathogens cause 76 million illnesses, 325,000 hospitalizations and 5,000 deaths annually in the United States. Land-Grant University and USDA research efforts help prevent, detect and cut contamination in the field and factory before meat and plant products reach consumers. And educational programs cover food handling at work, school and home.

Payoff

- **The big four.** Dangerous strains of *Campylobacter*, *Salmonella*, *E. coli* and *Listeria* are among the leading pathogens plaguing the food industry. **Arkansas** scientists developed a single test that can detect all four troublemakers, eliminating the need for time-consuming individual tests. Using the same four bacteria, **Tennessee** developed a geographic information system to analyze where these illness-causing organisms show up in animal and human populations at 16 locations nationwide. **Georgia** food scientists created a test that detects specific *Listeria* strains on cooked, ready-to-eat meat in one day instead of three or four and outperforms current microbiological detection procedures. After a listeriosis outbreak in 2002 killed 50 goats, **Cornell** researchers used genetic fingerprinting techniques to help eliminate the outbreak source and control the disease; no deaths were reported during subsequent breeding cycles. A **Georgia** poultry scientist found the causes of fecal contamination in seven poultry plants, helping produce a safer product for consumers and saving the companies about \$500,000 per day, the cost of shutting down each plant.
- **Smarter tests.** Scientists in **Georgia** also discovered that electrolyzed water, produced by passing electricity through a very dilute salt water solution, eliminates most foodborne pathogens on lettuce, apples, eggs and poultry in less than 30 seconds, replacing harsh chemicals. Another Georgia innovation accurately detects aflatoxin in peanuts and reduces sampling costs from \$5 to 50 cents. **Iowa State** scientists developed a hand-held detection system that reveals invisible fecal contamination. It can be used before and after the meat is trimmed. To protect the quality of the milk supply and the health of people allergic to certain antibiotics, **California** researchers developed a test to confirm and quantify seven common antibiotics in milk samples. **Nebraska** food scientists devised a simple, fast, accu-

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rate test that uses light instead of chloroform to detect cooking-oil freshness. Strategies for combating and detecting the presence of *E. coli* 0157:H7 and other bacteria are under way at **Arkansas, Kansas State, Nebraska, Nevada, North Carolina A&T, Purdue, Tennessee, Texas A&M** and other Land-Grant universities.

- **Cider's house rules.** Cider must carry a warning label unless it has been treated to destroy 99.999 percent of *Salmonella*, *Cryptosporidium*, *E. coli* and other bacteria that cause illness. Pasteurizing cider meets that requirement but is expensive for small producers. **Wisconsin** researchers identified a process that kills harmful bacteria without pasteurization, saving small farmers who can't afford pasteurization machines that cost up to \$30,000. **Cornell** and **Virginia Tech** also are tackling ways to eliminate *E. coli* in apple cider and other fruit juices that can cause life-threatening illness. **Oregon State** is researching *E. coli* and *Salmonella* threats to the \$140 million berry industry in the Pacific Northwest.
- **Hassle-free with HACCP.** As part of the Northern New England Seafood Alliance, **Maine** Extension offered courses certifying 600 seafood processors in Hazard Analysis of Critical Control Points principles. Post-training samples showed that implementing HACCP reduced *Listeria* contamination in ready-to-eat crabmeat from 18 percent to zero. Extension staff at **Kansas State, Nebraska, Missouri** and **South Dakota State** offered subsidized, hands-on HACCP training to small meat processors. In Kansas alone, these businesses realized a combined savings of more than \$54,000 while enhancing the quality and safety of meat products for consumers.
- **Biofilm festival.** *Listeria* is a major culprit in food recalls. The dangerous bacteria often lurk in the nooks and crannies of food processing equipment. **Wisconsin** scientists devised techniques to coat food processing machines, preparation surfaces and packaging with antimicrobial agents or with a film that prevents bacterial attachment. **Illinois, Maryland** and **Massachusetts** also are studying biofilm composition and adherence.

- **Dining, not whining.** Employee turnover in the food service industry and the need for constant training and supervision can increase the risk of foodborne illnesses. **Arizona** Extension's food handler training program resulted in 95 percent of the participants making improvements in at least one safe-food practice, changes that affect more than 200,000 children or at-risk adults. On average, more than 85 percent of the participants taking the National Restaurant Association Educational Foundation's ServSafe food handler certification course through **Iowa State, New Hampshire, West Virginia** and **Wyoming** pass the test the first time. Other states offering the course include **Colorado State, Georgia, Kansas State** and **Mississippi State**.
- **Wash your hands.** Extension educators nationwide are convincing children and adults to stop spreading germs by washing their hands. **Michigan State** Extension taught food safety to Detroit area growers representing more than 2,000 acres of produce production and employing 400 workers. One year later, nearly all of the growers had developed and adopted a hand-washing policy for their produce handlers. Out of more than 49,000 adults and youths in a **Tennessee** Extension program, 95 percent report they will wash their hands before and after handling foods. Ninety-two percent of the participants in a **New Hampshire** program said they wash hands before and after working with food at least 75 percent of the time. Of the nearly 1,650 children in the **Wisconsin** Nutrition Education Program, 98 percent reported washing their hands properly. An **Arkansas-Pine Bluff** Extension session inspired this comment: "After a class on food safety, I wash my hands longer and with soapy water."



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